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Proceedings of the Zonal Peer Review - Pre-COSEWIC Assessment for Roughhead Grenadier

September 7, 2016
St. John's, NL

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

A meeting of the Zonal Peer Review Process on the Pre-COSEWIC (Committee on the Status of Endangered Wildlife in Canada) Assessment for Roughhead Grenadier was held September 7, 2016 in St. John's, Newfoundland and Labrador (NL). The overall objective of this meeting was to peer-review existing Fisheries and Oceans Canada (DFO) information relevant to the COSEWIC status assessment for Roughhead Grenadier in Canadian waters, considering data related to the status and trends of, and threats to this species inside and outside of Canadian waters, and the strengths and limitations of the information.

These Proceedings include an abstract for each presentation, and a summary of the relevant discussions and key conclusions reached at the meeting. In addition, a Research Document resulting from the meeting will be published on the Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat's (CSAS) Website.

Compte rendu de l'examen zonal par les pairs – Examen pré-COSEPAC concernant le grenadier berglax

SOMMAIRE

Une réunion du processus d'examen zonal par les pairs sur l'examen pré-COSEPAC (Comité sur la situation des espèces en péril au Canada) concernant le grenadier berglax a eu lieu le 7 septembre 2016 à St. John's (Terre-Neuve-et-Labrador). L'objectif global de la réunion était de permettre à des pairs d'évaluer l'information actuelle de Pêches et Océans Canada (MPO) pouvant aider le COSEPAC à établir le statut du grenadier berglax dans les eaux canadiennes, y compris les données sur la situation de l'espèce, les tendances observées et les menaces qui pèsent sur elle, tant dans les eaux canadiennes que dans les eaux étrangères, ainsi que les points forts et les limites de cette information.

Le présent compte rendu comprend un résumé de chaque présentation de même qu'un sommaire des discussions pertinentes et des principales conclusions tirées lors de la réunion. De plus, un document de recherche découlant de la réunion sera publié sur le site Web du Secrétariat canadien de consultation scientifique (SCCS) du MPO.

INTRODUCTION

Fisheries and Oceans Canada (DFO) Science Branch held a Zonal Peer Review Process September 7, 2016 in St. John's, Newfoundland and Labrador (NL). The overall objective of the meeting, as described in the Terms of Reference (ToR; Appendix I) was to peer-review existing DFO information relevant to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status assessment for Roughhead Grenadier (*Macrourus berglax*) in Canadian waters, considering data related to the status and trends of, and threats to this species inside and outside of Canadian waters, and the strengths and limitations of the information.

Meeting participants were from DFO Science, Resource Management, and Species at Risk in the NL, Maritimes, and Central and Arctic Regions, COSEWIC Marine Fish Species Specialist Subcommittee (SSC) members, and an Aboriginal organization.

These Proceedings include an abstract for each presentation and a summary of the relevant discussions and the key conclusions reached at the meeting. In addition, a Research Document resulting from the meeting will be published on the Canadian Science Advisory Secretariat's (CSAS) Website.

PRESENTATIONS

OVERVIEW OF BIOLOGY, ECOLOGY AND LIFE HISTORY CONSIDERATIONS

Presenter: R. Collins

Abstract

Roughhead Grenadier in Canadian waters of the Northwest Atlantic Ocean was designated as Special Concern by COSEWIC in 2007. It was determined that they constituted one Designatable Unit (DU), distributed along the slope of the continental shelf from Davis Strait to the southern Grand Bank.

The Roughhead Grenadier is a demersal/benthopelagic non-schooling gadoid found at depths of 100 m to 2,200 m, or more. It prefers waters from 300-1,200 m, and temperatures of 1-5°C. Other habitat preferences have not been well-documented, though the species has been found in association with both coral and sponge grounds on the continental slopes of the Grand Banks and Flemish Cap.

It is broadly distributed in deep shelf and slope waters on both sides of the North Atlantic and in the Arctic Ocean. In the western North Atlantic, it occurs from Georges Bank in the south, northward to the Scotian Shelf; off the south coast of Newfoundland; along the Grand Bank and the northeast NL Shelves; into the Davis Strait off Baffin Island; and off western Greenland. In the eastern North Atlantic, it is found off eastern Greenland, Iceland, the Faroe Islands, Ireland, Norway, and Svalbard, as well as in the Barents Sea.

The Roughhead Grenadier is characterized by relatively slow growth (for both sexes). Females grow larger than males, mature later (at 13-16 years, as opposed to 8-9 years), and live longer. Maximum reported age for a female is 25 years.

The species does not possess a caudal fin, and tail breakage/regeneration makes measurement of total length problematic. In 1980, NAFO adopted pre-anal fin length (tip of snout to the base of first anal fin ray [AFL]) as the standardized measurement of length for this grenadier species.

Discussion

A participant questioned whether Roughhead Grenadier have been found in the stomachs of groundfish on St. Pierre Bank. It was suggested that Roughhead Grenadier may have only been found in the stomachs of White Hake and that an article by Petrov (1973) should be reviewed. It was stated that there are not many examples in the literature of groundfish eating grenadier.

Participants discussed aging and generation time of Roughhead Grenadier. The Working Paper (WP) estimated an age at maturity of 14 years. It was suggested by a participant that females reach maturity at 13 years and males at approximately 8-9 years. The precision of older data pertaining to age was questioned. It was suggested that some under-aging may be occurring. It was explained that the European Union (EU) regularly updates age data, and also that the NAFO Div. 3M surveys present age data. A participant noted that fish in deep water, such as Roughhead Grenadier, are difficult to age because there are little seasonal variations at great depths leading to little annual definition in otolith structure. The reliability of aging results is limited. Discussion also focused on the choice of M (natural mortality) in the calculation of generation time.

ROUGHHEAD GRENADIER DISTRIBUTION ON THE CONTINENTAL SHELVES OF NL

Presenter: L. Mello

Abstract

Catch and biological data from DFO multi-species bottom trawl surveys conducted in NL waters in spring (Divs. 3LNOPs; 1971-2015) and fall (Divs. 2GHJ3KLNO; 1977-2015) indicated that:

1. Most Roughhead Grenadier are found in water depths of 750-1,500 m (maximum depth fished) and temperatures ranging between 2-6°C;
2. Catch rates are consistently higher along the shelf slope in Divs. 2J3KLN (>20 fish/tow) and grenadiers are largely absent across the shelf and in all areas;
3. Area of occupancy varied without a trend in spring in Divs. 3LNOPs, whereas in fall the area of occupancy in Divs. 2J3KLNO decreased thru the 1980 and mid-1990s and increased thereafter;
4. Indices of abundance and biomass fluctuated without trend over 1971-2015 in Divs. 3LNOPs in spring, from 0.05 to 1.9 fish/tow and 0.06-1.4 kg/tow in 1971-83 (Yankee trawl), 0.007-1.3 fish/tow and 0.009-0.8 kg/tow in 1984-95 (Engel), and 0.7-4.7 fish/tow and 0.03-2.9 kg/tow in 1996-2015 (Campelen), with the lowest catch rates observed in Div. 3O and Subdiv. 3Ps ranging from 0.001 to 0.01 fish/tow and 0.001-0.01 kg/tow in 1971-83 (Yankee), 0.001-0.05 fish/tow and 0.001-0.03 kg/tow in 1984-95 (Engel), and 0.002-0.3 fish/tow and 0.0003-0.1 kg/tow in 1996-2015 (Campelen), whereas in fall the indices also varied without trend in the northern (Divs. 2GH) and southern areas (Divs. 3LNO) surveyed, and declined in Divs. 2J3K over 1977-94, followed by an increasing trend in 1995-2015. Catch rates in Divs. 2GH ranged from 0.2 to 7.6 fish/tow and 0.05-5.3 kg/tow in 1977-95 (Engel), and 1.3-9.2 fish/tow and 0.3-1.9 kg/tow in 1995-2015 (Campelen). In Divs. 2J3K, catch rates ranged from 0.3 to 6.5 fish/tow and 0.2-5.3 kg/tow in 1977-95 (Engel), and 2.2-10.1 fish/tow and 0.2-4.4 kg/tow in 1995-2015 (Campelen). In Divs. 3LN, catch rates ranged from 0.03 to 5.6 fish/tow and 0.03-5.4 kg/tow in 1977-95 (Engel), and 1.0-5.7 fish/tow and 0.1-3.4 kg/tow in 1995-2015 (Campelen). Catch rates in Div. 3O were consistently lower,

ranging from 0.05 to 0.08 fish/tow and 0.03-0.06 kg/tow in 1991-94, and 0.03-0.2 fish/tow and 0.005-0.07 kg/tow in 1995-2015;

5. Estimates of relative abundance and biomass in the spring indicated that most Roughhead Grenadier were found in Div. 3L, followed by Div. 3N, with only a small portion in Div. 3O and Subdiv. 3Ps. Total abundance and biomass estimates fluctuated between 1.0-5.5 million fish and 600-4,000 t (respectively) in 1971-82, then exhibited a declining trend to 0.9 million fish and 320 t in 1995. In 1996-2015 (Campelen), these indices ranged from 8 to16 million fish and 2,000-7,000 t. Fall survey estimates in Divs. 2GHJ3KLNO indicated a declining trend over 1978-94 followed by an increasing trend thereafter with most Roughhead Grenadier consistently found in Divs. 3KL, followed by Divs. 2J3N since 1995, and only a small portion in Divs. 2GH3O. Total abundance and biomass indices declined by an order of magnitude over 1987-94: from 31 million fish and 25,000 t (respectively) to 3 million fish and 2,000 t. Since 1995 (Campelen), these estimates increased from 29 million fish and 7,000 t to 98 million fish and 38,000 t in 2013, but then declined to 61 million fish and 29,000 t by 2015;
6. Fall survey abundance in Divs. 2J3K and Divs. 3LNO (1977-94) declined by 89% and 79% respectively, followed by an increase in abundance of 99% and 73% by 2015, spring abundance declined by 53% and 15% in Divs. 3LNO over 1984-95 and 1996-2015 respectively, whereas in Subdiv. 3Ps, this species increased in abundance during 1984-95 by 93%, followed by an 83% decline in 1996-2015. Insufficient data are available to produce estimates of the rate of change in abundance for Div. 2GH;
7. Total annual abundance-at-length in spring (Divs. 3LNOPs) periodically represented at least one year-class through 1996-2015 and pulses of recruitment were detected in 2003, 2005, 2010, 2012 and 2015, similar trends were also detected in fall (Divs. 2J3KLNO);
8. The relative abundance-at-length by life history stage (immature: ≤27.5 cm pre-anal fish length and adult >27.5 cm) indicated that in spring both life stages declined in the mid-1980s then stabilized at low levels with immatures comprising 88-100% of the sampled population. Since 1996, both components fluctuated at low levels with 98-100% immature fish caught. Data from fall surveys in Divs. 2J3K indicate that both life stages had declined since the early 1980s to their lowest levels in 1994. The proportion of immature fish gradually increased (92% to 99%), followed by a gradual increase in the relative abundance of both components since 1995, with a slightly increasing proportion of adults captured from 2010 to 2015. Of note, this analysis includes both male and female individuals and assumes that the length at 50% maturity (L50) is the same for both groups, therefore the analysis might be biased in case L50 is gender specific;
9. Finally, it was noted that due to lack of an efficiency conversion factor among fishing gears (Yankee, Engel and Campelen) trends in population abundance, biomass and distribution, as well the rate of decline and increase are not comparable among the three gears. Other sources of variability include differences in depth stratification and area coverage in spring and fall surveys, as well incomplete/partial spatial coverage in some years. Overall, these sources of variability would make it difficult to compare and interpret apparent trends and integrate both time-series for the purpose of this assessment.

Discussion

Size at maturity (AFL) was determined to be approximately 16 cm for males and 27.5 cm (69.7 cm total length) for females, and it was noted that it is uncommon to find male Roughhead

Grenadier larger than 27.5 cm. A participant stated that males and females would have to be separated by different lengths to review the total mature population of Roughhead Grenadier.

A participant questioned whether the abundance trend plots confidence limits were calculated using standard errors or bootstrap estimates. The participant commented that bootstrap confidence intervals (CIs) would provide a more precise estimate.

Weighted (i.e. adjusted for the number of fishing sets in each survey) and unweighted surface density plots of Campelen catch rates for the NL Region were presented by a participant. For both weighted and unweighted approaches, there was a concentration of Roughhead Grenadier near the border of Divs. 3L and 3M. However, it was explained that if one adjusts the number of sets, a somewhat different distribution and concentration is shown. The participant also presented weighted and unweighted surface density plots for the Campelen fishing sets in the Central and Arctic (C&A) Region. Participants noted that the change in distribution and concentration within the C&A Region was not as noticeable as the change in the NL Region. The change was partly due to the bias introduced by combining surveys. They also noted that the catches of Roughhead Grenadier have declined/disappeared in Divs. 0A and 1A in recent years. It was explained that the goal of the spatial distribution analysis was qualitative in nature, and that a quantitative analysis would have taken a similar approach recommended by the participant (i.e. weighted kernel density estimation/unweighted kernel density estimation). It was concluded that the authors of the WP would review for potential bias of the kernel density plots prior to publication.

In both the WP and the previous COSEWIC status report, the issue of Roughhead Grenadier moving to deeper waters was highlighted. Participants discussed different interpretations of Roughhead Grenadier apparently disappearing from shallow waters (trenches between banks) during the late 1980s and early 1990s. One participant hypothesized that Roughhead Grenadier may have shifted from shallow to deep waters rather than disappeared from shallow waters. This interpretation could explain in part the decrease of Roughhead Grenadier from the 1980s and early 1990s and increase thereafter. It was explained however that Roughhead Grenadier was recommended by COSEWIC for listing under the *Species at Risk Act* (SARA) as Special Concern due to its slow growing nature and lack of management constraints on catch, rather than a decline in abundance.

ROUGHHEAD GRENADIER DISTRIBUTION ON THE SCOTIAN SHELF AND SLOPE

Presenter: D. Themelis

Abstract

Annual summer research surveys using bottom trawls in the Maritimes Region only sampled to depths of about 350 m from 1970 to 1995 when deep-water strata (>365 m) were added to the sampling protocol. Other surveys sampling deep areas of the Scotian Shelf and slope were a fall bottom trawl survey from 1982 to 1988 (200-900 m), a joint DFO-Industry bottom trawl survey from 1994-95 (901-1,830 m) and exploratory fishing trials using gillnets between 500 and 2,800 m in 1991. These surveys indicate that Roughhead Grenadier is broadly distributed along the slope at depths greater than 350 m, occurring along the slope from the Laurentian Channel and south of Banquereau, Sable Island, Emerald and LaHave Banks. Numbers and occurrences are too low to provide a useful time series. A comparison of length frequencies indicates that no mature animals (i.e. >69.7 cm total length) have been caught in the annual research surveys. Animals large enough to be mature are present at depths >900 m, based on the length range of animals caught during the DFO-Industry survey and the fishing trials. Observations by at-sea observers from 1980 to 2015 indicate that Roughhead Grenadier has

been caught during commercial fishing operations targeting silver hake, redfish and halibut along the edge of the Scotian Shelf and in the Laurentian Channel.

Discussion

A participant questioned the Fisheries Observers reports of Roughhead Grenadier on the Div. 3P side of the Laurentian Channel and up to the Gulf of St. Lawrence, as Roughhead Grenadier have not been caught by Quebec or NL surveys in the same areas. Misidentification of Roughhead Grenadier was explained to be a likely reason for the contradiction.

Participants questioned whether there were any indications of Roughhead Grenadier south of the Canadian border. It was explained that the Maritimes Region does not conduct their surveys at depths where grenadier are normally found. A participant asked why large Roughhead Grenadier (possibly mature) have been caught in the Maritimes but not in the NL Region. A participant explained that large Roughhead Grenadier had been caught at depths greater than 900 m, and suggested that larger Roughhead Grenadier are more susceptible to capture by fixed gear than mobile gear based on the numbers caught in exploratory fishing using gillnets. A participant also articulated that literature suggests that larger Roughhead Grenadier are found in deeper waters and also that females rather than males are more likely to frequent deeper waters (>1,550 m). It was noted that very few Roughhead Grenadier are caught in American surveys but their surveys don't include water depths where the species would be expected to be found.

ROUGHHEAD GRENADIER DISTRIBUTION IN NAFO DIV. 0A AND 0B

Presenter: M. Treble

Abstract

Stratified-random otter trawl surveys have been conducted in Baffin Bay and Davis Strait since 1999. The surveys are conducted in collaboration with the Greenland Institute of Natural Resources on their research vessel Pâmiut. NAFO Subarea 0 is a large area and it was not possible to survey the whole area in any one year. Southern Div. 0A (0A-South) to approximately 72° N and at depths 400 m to 1,500 m was a focal area and was surveyed in 1999, 2001, 2004, 2006, 2008, 2010, 2012, 2014 and 2015 using the Alfredo III bottom trawl. In 2006 and 2008, depths from 100 m to 800 m were also surveyed using a Cosmos shrimp trawl. The northern portion of Div. 0A (between 72° ° N and 76° N) was surveyed in 2004, 2010 and 2012 using the Alfredo trawl. Div. 0B (400 m to 1,500 m) was surveyed in 2000, 2001, 2011, 2013, 2014 and 2015, also using the Alfredo III trawl. All surveys took place in the fall, typically during September and October. Set selection is based on a coverage level of approximately 1 set per 750 km^2. A minimum of two sets were randomly selected from numbered units within each sub-stratum (the depth strata are sub-divided into multiple sub-strata in 0A and parts of 0B) using a buffered random design. The 0A-South survey has 77 sets, 0A-North survey has 98 sets, and 0B has 92 sets, allocated across the 400 m to 1,500 m depth strata. Ice and weather conditions affected coverage of the 2001 survey in Div. 0B and the 2006 survey in Div. 0A-South. In Div. 0A-South mean bottom temperature declined with depth from 1.4°C to 0.0°C. Mean bottom temperatures in 0B were warmer, 2.7°C to 4.1°C, with the warmest temperatures at depths deeper than 800 m. Maps of Roughhead Grenadier catch in these surveys showed that the species was distributed primarily in Div. 0B and therefore the remainder of the presentation focused on data from this area. Catch rates varied across years with no trend (1995-2005), ranging from 3 to 12 fish per tow, or 3-7 kg/tow (excluding the 2001 estimate). Biomass for Div. 0B varied around 3,000 t and abundance ranged from 5 to 9 million. Most of these fish were located in the south along the Atlantic slope and adjacent waters.

Length for grenadier species was measured to the lowest 0.5 cm pre-anal fin length. Due to the small catches of Roughhead Grenadier the data were pooled into two samples. The overall length distributions were similar; 2 cm to 34 cm, and 2 cm to 38 cm for years 2000 and 2001 (n=956), and years 2011 and 2013 to 2015 (n=2,064), respectively. However, the modes were slightly different, with a mode of 13 cm for 2000 and 2001, and a mode of 17 cm for 2011, 2013-15. Over 95% of the Roughhead Grenadier caught in the surveys were immature.

Discussion

A participant commented that this northern survey covers only a relatively small portion of the population of Roughhead Grenadier. They remarked that each Region uses various surveying techniques and each gear captures different proportions of the Roughhead Grenadier population in terms of size.

OTHER SURVEYS CONDUCTED OUTSIDE THE CANADIAN EXCLUSIVE ECONOMIC ZONE (EEZ)

Presenter: M. Simpson

Abstract

Given the continuous distribution of Roughhead Grenadier, surveys outside the Canadian EEZ can contribute to our knowledge of the stock within Canadian waters. In particular, the EU-Spain surveys that are conducted in NAFO Divs. 3NO, 3L and 3M (<700 m and <1400 m), and the West Greenland surveys conducted by the Greenland Institute of Natural Resources in NAFO Divs. 1CD, can be especially informative. During the period 2005-12, a downward trend is evident in the EU-Spain 3L, 3NO, and 3M surveys. More recently, the Flemish Cap (3M) indices (<700 m and <1400 m) continued to decline during 2013-15, while the EU-Spain 3L survey index increased. The EU-Spain 3NO index has generally declined since 2004, though the index was up in 2015 relative to 2014. However, these are relatively short time series that cover only a small portion of the entire population. In the West Greenland waters of Divs. 1CD, the index varied without trend during 1988-95. During the period 1997-2000, the index increased and then declined until 2007. The index has varied without trend since 2008, averaging approximately 5 million.

Discussion

Meeting participants stated that it was difficult to draw conclusions about the current status of the stock due to conflicting trends in survey indices. However, participants did conclude that there was some concern surrounding the state of the species on the Flemish Cap, which is outside the Canadian EEZ, based on the declining trend in the EU survey data. The previous COSEWIC status report concluded that there is only one DU for Roughhead Grenadier. Surveys from multiple Regions, genetic, and morphometric data support one DU for Roughhead Grenadier. Thus, the most highly aggregated indices encompassing the broadest area of the stock should provide the most reliable index of abundance.

THREATS AND DECLINE

Presenter: M. Simpson

Abstract

Potential anthropomorphic threats to Roughhead Grenadier populations were presented. These included seismic surveys, oil and gas drilling, aquaculture siting/activities, pollution, invasive

species, climate change, marine shipping, and fishing. Little quantitative data are available to assess the nature and magnitude of potential impacts to Roughhead Grenadier populations. It was concluded that impacts of near shore disturbances such as aquaculture, waste water outflows, and aquatic invasive species are likely to be insignificant. It was also concluded that the direct impacts of various offshore activities such as seismic testing, oil development, marine shipping, as well as the consequences of climate change, are unknown at this time but as a deep water species, seismic effects at great depths are likely insignificant. Only early life stages living in the upper water column are potentially affected by seismic activities. Fishing mortality has been very low in recent years (2013-15), with removals averaging 400 t, due mainly to bycatch in the offshore Greenland Halibut (turbot) fishery.

Discussion

A participant recommended switching the terminology of some of the possible threats from "unknown" to "unlikely". For example, seismic activity would be an unlikely rather than an unknown threat to Roughhead Grenadier. It was suggested that bycatch from the Greenland Halibut (turbot) fishery is the dominant quantified threat to Roughhead Grenadier.

There was discussion regarding the Northern Shrimp Research Foundation's (NSRF) surveys. A participant presented spatial distribution plots based on NSRF survey data. It was noted by participants that there were higher densities of Roughhead Grenadier along the edge of Div. 2G in slope waters. Trends in the NSRF survey were also presented showing a general increase in abundance of Roughhead Grenadier in that survey.

It was highlighted that despite the large fluctuations in population size over the last few decades, the habitat occupied by Roughhead Grenadier has remained largely unchanged in both the spring and fall, with the majority of the population concentrated along the continental shelf slope in NL waters, as well as the Flemish Cap and Pass. The variability surrounding EU-Flemish Cap data was also discussed.

FISHERY DATA

Presenter: M. Simpson

Abstract

Fisheries removals of Roughhead Grenadier in the Northwest Atlantic were presented for 1987-2015, using commercial data available in three databases: NAFO STATLANT-21A landings data (1987-2015) reported by NAFO-member countries fishing mainly outside Canada's 200-mile limit; DFO-NL ZIFF (Zonal Interchange File Format) landings data (1998-2015) reported by Canadian fishers operating in Canada's EEZ; and Canadian Fisheries Observers' catch data (1995-2014) collected on a set-by-set basis at sea aboard commercial fishing vessels. Canadian Fisheries Observers constitute the only reliable source of information on speciated commercial catches and discards at sea. A brief overview of each commercial database was given, including a cautionary note regarding NAFO grenadier landings reported in 1987-96. Commercial length frequencies of Roughhead Grenadier in Greenland Halibut (Turbot) fisheries conducted by EU-Spain, EU-Portugal, Russia, and Canada were also presented. Reported landings of Roughhead Grenadier have substantially declined since 2001, and averaged 400 t over 2013-15 due primarily to bycatch in the offshore Turbot fishery. It was noted that discards at sea are never recorded by fishers in Canadian and foreign fisheries, so total commercial removals from the Roughhead Grenadier population remain unknown.

Discussion

The peak in NAFO reported landings that occurred during the mid-1990s was questioned. It was explained that the NAFO-reported landings data prior to 1997 may not be accurate due to misreporting of Roundnose Grenadier as Roughead Grenadier.

A participant questioned whether discarding of Roughhead Grenadier occurs in the Greenland Halibut fishery. It was explained that during a test fishery that occurred in shallow waters, there were high discards of grenadier.

A participant questioned whether pre-anal fish lengths could be converted to total length of Roughhead Grenadier. An article by Atkinson (1991) was identified as the source of the conversion factors used in the WP.

REFERENCES CITED

Atkinson, Bruce. 1991. Relationships Between Pre-anal fin Length and Total Length of Roughhead Grenadier (*Macrourus berglax lacépède*) in the Northwest Atlantic. J. Northw. Atl. Fish. Sci. 11: 7-9.

Petrov, V.N. 1973. Maturity, feeding, length/age composition of white hake, *Urophycis tenuis* (Mitch.), in Subarea 3 in 1969, 1971, and 1972. ICNAF Res. Doc. 73/39. 9 p.

APPENDIX I: TERMS OF REFERENCE

Pre-COSEWIC Assessment for Roughhead Grenadier

Zonal Peer Review Meeting – Newfoundland and Labrador, Maritimes, and Central and Arctic Regions

September 7-8, 2016
St. John's, NL

Chairperson: John Brattey

Context

The implementation of the federal *Species at Risk Act* (SARA), proclaimed in June 2003, begins with an assessment of a species' risk of extinction by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC is a non-government scientific advisory body that has been established under Section 14(1) of SARA to perform species assessments, which provides the scientific foundation for listing species under SARA. Therefore, an assessment initiates the regulatory process whereby the competent Minister must decide whether to accept COSEWIC's assessment and add a species to Schedule 1 of SARA, which would result in legal protection for the species under the Act. If the species is already on Schedule 1 of SARA, the Minister may decide to keep the species on the list, reclassify it as per the COSEWIC assessment, or to remove it from the list (Section 27 of SARA).

Fisheries and Oceans Canada (DFO), as a generator and archivist of information on marine species and some freshwater species, is to provide COSEWIC with the best information available to ensure that an accurate assessment of the status of a species can be undertaken.

The Roughhead Grenadier (*Macrourus berglax*) was listed on COSEWIC's fall 2015 Call for Bids to produce a status report.

Objectives

The overall objective of this meeting is to peer-review DFO existing information relevant to the COSEWIC status assessment for Roughhead Grenadier in Canadian waters, considering data related to the status and trends of, and threats to this species inside and outside of Canadian waters, and the strengths and limitations of the information. This information will be available to COSEWIC, the authors of the species status report, and the co-chairs of the applicable COSEWIC Species Specialist Subcommittee. Publications from the peer-review meeting (see below) will be posted on the CSAS website.

Specifically, DFO information relevant to the following will be reviewed to the extent possible:

1. **Life history characteristics**
    - Growth parameters: age and/or length at maturity, maximum age and/or length
    - Total and natural mortality rates and recruitment rates (if data are available)
    - Fecundity
    - Generation time
    - Early life history patterns
    - Specialised niche or habitat requirements

2. Review of designatable units

Available information on population differentiation, which could support a COSEWIC decision of which populations below the species' level would be suitable for assessment and designation, will be reviewed. Information on morphology, meristics, genetics and distribution will be considered and discussed.

See COSEWIC 2008 "Guidelines for recognizing Designatable Units".

3. **Review the COSEWIC criteria** for the species in Canada as a whole, and for each designatable units identified, if any (see "Wildlife Species Assessment: COSEWIC Assessment Process, Categories and Guidelines")

COSEWIC Criterion – Declining Total Population

1. Summarize overall trends in population size (both number of mature individuals and total numbers in the population) over as long a period as possible and in particular for the past three generations (taken as mean age of parents). Additionally, present data on a scale appropriate to the data to clarify the rate of decline.
2. Identify threats to abundance— where declines have occurred over the past three generations, summarize the degree to which the causes of the declines are understood, and the evidence that the declines are a result of natural variability, habitat loss, fishing, or other human activity.
3. Where declines have occurred over the past three generations, summarize the evidence that the declines have ceased, are reversible, and the likely time scales for reversibility.

COSEWIC Criterion – Small Distribution and Decline or Fluctuation: for the species in Canada as a whole, and for designatable units identified, using information in the most recent assessments:

1. Summarise the current extent of occurrence (in km^2) in Canadian waters
2. Summarise the current area of occupancy (in km^2) in Canadian waters
3. Summarise changes in extent of occurrence and area of occupancy over as long a time as possible, and in particular, over the past three generations.
4. Summarise any evidence that there have been changes in the degree of fragmentation of the overall population, or a reduction in the number of meta-population units.
5. Summarise the proportion of the population that resides in Canadian waters, migration patterns (if any), and known breeding areas.

COSEWIC Criterion – Small Total Population Size and Decline and Very Small and Restricted: for the species in Canada as a whole, and for designatable units identified, using information in the most recent assessments:

1. Tabulate the best scientific estimates of the number of mature individuals;
2. If there are likely to be fewer than 10,000 mature individuals, summarize trends in numbers of mature individuals over the past 10 years or three generations, and, to the extent possible, causes for the trends.

Summarise the options for combining indicators to provide an assessment of status, and the caveats and uncertainties associated with each option.

For transboundary stocks, summarise the status of the population(s) outside of Canadian waters. State whether rescue from outside populations is likely.

4. Describe the characteristics or elements of the species habitat to the extent possible, and threats to that habitat

Habitat is defined as "in respect of aquatic species, spawning grounds and nursery, rearing, food supply, migration and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced".

The phrasing of the following guidelines would be adapted to each specific species and some could be dropped on a case-by-case basis if considered *biologically* irrelevant. However, these questions should be posed even in cases when relatively little information is expected to be available, to ensure that every effort is made to consolidate whatever knowledge and information does exist on an aquatic species' habitat requirements, and made available to COSEWIC.

1. Describe the functional properties that a species' aquatic habitat must have to allow successful completion of all life history stages.

   In the best cases, the functional properties will include both features of the habitat occupied by the species and the mechanisms by which those habitat features play a role in the survivorship or fecundity of the species. However, in many cases the functional properties cannot be described beyond reporting patterns of distribution observed (or expected) in data sources, and general types of habitat feature known to be present in the area(s) of occurrence and suspected to have functional properties. Information will rarely be equally available for all life history stages of an aquatic species, and even distributional information may be missing for some stages. Science advice needs to be carefully worded in this regard to clearly communicate uncertainties and knowledge gaps.

2. Provide information on the spatial extent of the areas that are likely to have functional properties.

   Where geo-referenced data on habitat features are readily available, these data could be used to map and roughly quantify the locations and extent of the species' habitat. Generally however, it should be sufficient to provide narrative information on what is known of the extent of occurrence of the types of habitats identified. Many information sources, including Aboriginal Traditional Knowledge (ATK) and experiential knowledge, may contribute to these efforts.

3. Identify the activities most likely to threaten the functional properties, and provide information on the extent and consequences of those activities.

   COSEWIC's operational guidelines require consideration of both the imminence of each identified threat, and the strength of evidence that the threat actually does cause harm to the species or its habitat. The information and advice from the Pre-COSEWIC review should provide whatever information is available on both of those points. In addition, the information and advice should include at least a narrative discussion of the magnitude of impact caused by each identified threat when it does occur.

4. Recommend research or analysis activities that are necessary.

   Usually the work on the other Guidelines will identify many knowledge gaps.

   Recommendations made and enacted at this stage in the overall process could result in much more information being available should a Recovery Potential Assessment be required for the species.

5. Describe to the extent possible whether the species has a residence as defined by SARA

SARA's 2(1) defines Residence as "a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating."

6. Threats

A threat is any activity or process (both natural and anthropogenic) that has caused, is causing, or may cause harm, death, or behavioural changes to a species at risk or the destruction, degradation, and/or impairment of its habitat to the extent that population-level effects occur. Guidance is provided in: Environment Canada, 2007. Draft Guidelines on Identifying and Mitigating Threats to Species at Risk. *Species at Risk Act* Implementation Guidance.

List and describe threats to the species considering:

- Threats need to pose serious or irreversible damage to the species. It is important to determine the magnitude (severity), extent (spatial), frequency (temporal) and causal certainty of each threat.
- Naturally limiting factors, such as aging, disease and/or predation that limit the distribution and/or abundance of a species are not normally considered threats unless they are altered by human activity or may pose a threat to a critically small or isolated population.
- Distinction should be made between general threats (e.g. agriculture) and specific threats (e.g. siltation from tile drains), which are caused by general activities.
- The causal certainty of each threat must be assessed and explicitly stated as threats identified may be based on hypothesis testing (lab or field), observation, expert opinion or speculation.

7. Other

Finally, as time allows, review status and trends in other indicators that would be relevant to evaluating the risk of extinction of the species. This includes the likelihood of imminent or continuing decline in the abundance or distribution of the species, or that would otherwise be of value in preparation of COSEWIC Status Reports.

Working Paper

A working paper related to the status of the Roughhead Grenadier may be submitted for review 2 weeks prior to the meeting.

Expected Publications

- Proceedings
- Research Document

Expected Participation

- Fisheries and Oceans Canada (DFO) (Ecosystems and Oceans Science, Species at Risk Management, and Ecosystems and Fisheries Management sectors)
- COSEWIC status report author
- Members of COSEWIC (Co-Chairs and/or the Species Specialist Subcommittee)

APPENDIX II: AGENDA

Zonal Peer Review Meeting – Newfoundland and Labrador, Maritimes, and Central and Arctic Regions

Pre-*COSEWIC* Assessment of Roughhead Grenadier

September 7-8, 2016

Memorial Room, NWAFC, St. John's, NL

Chairperson: John Brattey

September 7, 2016

Time	Activity	Presenter
9:00	Introduction/ Review Terms of Reference	*Chair*
-	Biology and Life History	*R. Collins*
	Newfoundland and Labrador Survey Results	*L. Mello*
-	Maritimes Survey Results	*D. Themelis*
-	Central and Arctic Survey Results	*M. Treble*
-	Other Surveys	*M. Simpson*
	Fishery data	*C. Miri*
-	Threats and Decline	*All*
-	Review of the Designatable Unit(s) and *COSEWIC* Criteria	*All*
-	Discussion	*All*

September 8, 2016

Time	Activity	Presenter
9:00	Discussion	*All*

Notes:

- Agenda remains fluid and may change. Breaks to be determined as meeting progresses.
- Health breaks will typically occur at 10:30 a.m. and 2:30 p.m. Coffee and tea can be purchased from the cafeteria.
- Lunch (not provided) will normally occur between 12:00 to 1:00 p.m.

APPENDIX III: LIST OF PARTICIPANTS

Name	Affiliation
John Brattey (Chair)	DFO Science – NL
Jim Meade	DFO Science – NL(CSA Office)
Erika Parrill	DFO Science – NL(CSA Office)
Sue Forsey	DFO Species at Risk – NL
Dave Kulka	COSEWIC SSC
Bruce Atkinson	COSEWIC SSC
Mark Simpson	DFO Science – NL
Roanne Collins	DFO Science – NL
Luiz Mello	DFO Science – NL
Margaret Treble	DFO Science – Central & Arctic
Daphne Themelis	DFO Science – Maritimes
Rick Rideout	DFO Science – NL
Brian Healey	DFO Science – NL
David Coffin	DFO Resource Management – NL
Joshua McNeely (teleconference)	IKANAWTIKET